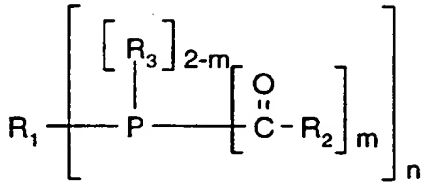
What is claimed is

1. A process for the preparation of acyl phosphines of formula I



(I), wherein

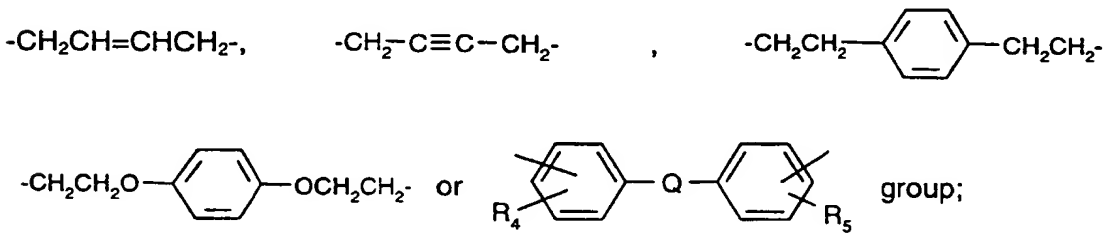
n and **m** are each independently of the other 1 or 2;

R_1, if n = 1, is

C_1-C_{18}alkyl, C_2-C_{18}alkyl which is interrupted by one or several non-successive O atoms; phenyl-substituted C_1-C_4alkyl, C_2-C_8alkenyl, phenyl, naphthyl, biphenyl, C_5-C_{12}cycloalkyl or a 5- or 6-membered O-, S- or N-containing heterocyclic ring, the radicals phenyl, naphthyl, biphenyl, C_5-C_{12}cycloalkyl or the 5- or 6-membered O-, S- or N-containing heterocyclic ring being unsubstituted or substituted by one to five halogen, C_1-C_8alkyl, C_1-C_8-alkylthio and/or C_1-C_8alkoxy;

R_1, if n = 2, is

C_1-C_{18}alkylene, C_2-C_{18}alkylene which is interrupted by one or several non-successive O atoms; or R_1 is C_1-C_6alkylene which is substituted by C_1-C_4alkoxy, phenyl, C_1-C_4alkylphenyl, phenyl-C_1-C_4alkyl or C_1-C_4alkoxyphenyl; or R_1 is phenylene or xylylene, which radicals are unsubstituted or substituted by one to three C_1-C_4alkyl and/or C_1-C_4alkoxy, or R_1 is a



group;

R_2 is C_1-C_{18}alkyl, C_3-C_{12}cycloalkyl, C_2-C_{18}alkenyl, phenyl, naphthyl, biphenyl or a 5- or 6-membered O-, S- or N-containing heterocyclic ring, the radicals phenyl, naphthyl, biphenyl or 5- or 6-membered O-, S- or N-containing heterocyclic ring being unsubstituted or substituted by one to four C_1-C_8alkyl, C_1-C_8alkoxy, C_1-C_8alkylthio and/or halogen;

R_3 is C_1-C_{18}alkyl, C_2-C_{18}alkyl which is interrupted by one or several non-successive O atoms; phenyl-substituted C_1-C_4alkyl, C_2-C_8alkenyl, phenyl, naphthyl, biphenyl, C_5-C_{12}-cycloalkyl or a 5- or 6-membered O-, S- or N-containing heterocyclic ring, the radicals

phenyl, naphthyl, biphenyl, C_5-C_{12}cycloalkyl or the 5- or 6-membered O-, S- or N-containing heterocyclic ring being unsubstituted or substituted by one to five halogen, C_1-C_8alkyl, C_1-C_8alkylthio and/or C_1-C_8alkoxy;

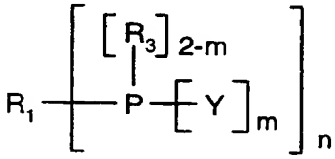
Q is a single bond, CR_6R_7, -O- or -S- ;

R_4 and R_5 are each independently of the other hydrogen, C_1-C_4alkyl or C_1-C_4alkoxy;

R_6 and R_7 are each independently of the other hydrogen or C_1-C_4alkyl;

by

(1) reacting organic phosphorus halides of formula II



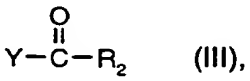
(II),

wherein R_1, R_3, **n** and **m** have the meaning cited above,

and **Y** is Br or Cl,

with an alkali metal or with magnesium in combination with lithium, or with mixtures thereof, where appropriate in the presence of a catalyst, and

(2) subsequent reaction with m acid halides of formula III

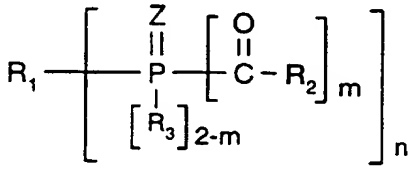


(III),

wherein R_2, **Y** and **m** have the meaning cited above;

which process is carried out without isolation of the intermediates.

2. A process for the preparation of acylphosphine oxides and acylphosphine sulfides of formula IV



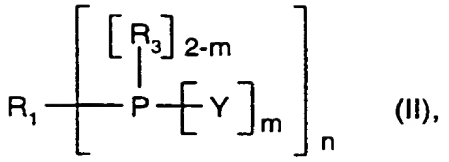
(IV), wherein

R_1, R_2, R_3, **n** and **m** have the meaning cited in claim 1, and

Z is O or S,

by

(1) reacting organic phosphorus halides of formula II

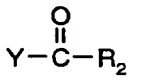


(II),

wherein R_1, R_3, **Y**, **n** and **m** have the meaning cited in claim 1,

with an alkali metal or with magnesium in combination with lithium, or with mixtures thereof, where appropriate in the presence of a catalyst, and

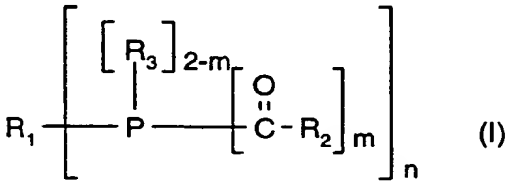
(2) subsequent reaction with m acid halides of formula III



(III),

wherein R_2, **m** and **Y** have the meaning cited in claim 1, and

(3) oxidation or reaction with sulfur of the acylphosphine of formula I



(I)

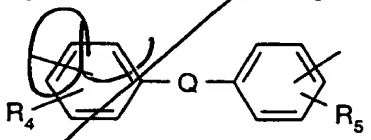
which is obtained by reaction (2),

wherein R_1, R_2, R_3, **m** and **n** have the meaning cited in claim 1,

which process is carried out without isolation of the intermediates.

3. A process according to either claim 1 or claim 2, wherein

R_1, if n = 1, is C_1-C_{12}alkyl, cyclohexyl, phenyl or biphenyl, the radicals phenyl and biphenyl being unsubstituted or substituted by one to four C_1-C_8alkyl and/or C_1-C_8alkoxy;

R_1, if n = 2, is C_6-C_{10}alkylene, or  ;

R_3 is C_1-C_{12}alkyl, cyclohexyl, phenyl or biphenyl, the radicals phenyl and biphenyl being unsubstituted or substituted by one to four C_1-C_8alkyl and/or C_1-C_8alkoxy;

Q is a single bond or -O- , and

R_4 and R_5 are hydrogen.

4. A process according to either claim 1 or claim 2, wherein
R_2 is phenyl which is substituted in 2,6- or 2,4,6-position by C_1-C_4alkyl and/or C_1-C_4alkoxy.

5. A process according to either claim 1 or claim 2, wherein **n** is 1.

6. A process according to either claim 1 or claim 2, wherein **Y** in formula II is chloro.

7. A process according to either claim 1 or claim 2, wherein the reaction (1) is carried out using lithium, sodium or potassium.

8. A process according to claim 7, wherein from 4 to 6 atom equivalents of the alkali metal are used for the preparation of compounds of formula I, wherein m is 2, and 2 to 3 atom equivalents of the alkali metal are used for the preparation of compounds of formula I, wherein m is 1.

9. A process according to either claim 1 or claim 2, wherein Y in the compounds of formula III is chloro.

10. A process according to either claim 1 or claim 2, which comprises carrying out the reaction (1) in the presence of a catalyst, preferably naphthalene or biphenyl.

11. A process according to either claim 1 or claim 2, which comprises carrying out the reaction (1) of the organic phosphorus halides (II) with an alkali metal in the temperature range from -20° to +120°C.

12. A process according to either claim 1 or claim 2, which comprises carrying out the reaction (1) of the organic phosphorus halides (II) with magnesium in combination with an alkali metal in the temperature range from 80° to 120°C.

13. A process according to either claim 1 or claim 2, wherein the reaction (2) of the metallised phosphine with the acid chloride (III) is carried out at -20° to +80°C.

14. A process according to either claim 1 or claim 2, wherein the reaction steps (1) and (2) are carried out in the same solvent, preferably in tetrahydrofuran.

15. A process according to either claim 1 or claim 2, wherein, in formula I, n is 1, m is 1 or 2, R_1 is phenyl which is unsubstituted or substituted by C_1-C_4alkyl or C_1-C_8alkoxy, or R_1 is C_1-C_{12}alkyl; R_2 is phenyl which is substituted by halogen, C_1-C_4alkoxy or C_1-C_4alkyl; and R_3 is unsubstituted or C_1-C_4alkyl-substituted phenyl.

16. A compound obtained by the process according to either claim 1 or claim 2.